

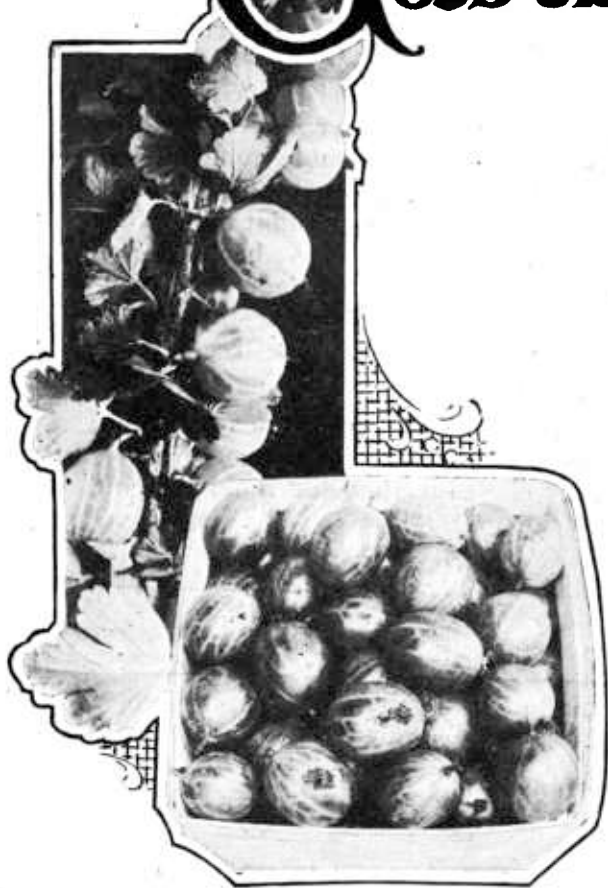
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Currants and Gooseberries



THIS BULLETIN gives information with regard to the essential features of currant and gooseberry culture, indicates the regions in which these plants may be grown, and points out certain restrictions on their culture due to insect pests and diseases.

In localities where it has become established the currant maggot, an insect for which there is no satisfactory method of control, practically prohibits the successful growing of both these fruits.

Blister rust, a disease that is very destructive to white-pine trees and which passes one stage of its growth on currants and gooseberries, is a serious menace in some sections. In order to protect these trees wherever they represent valuable lumber interests it is necessary to destroy all currant and gooseberry bushes in such areas and to prohibit the further planting of them. The laws which have been enacted by several States to this end and the Federal quarantine regulations respecting the interstate shipment of currant and gooseberry plants and pine-tree nursery stock are explained in these pages.

The reader will find helpful suggestions regarding the selection of varieties of currants and gooseberries for planting, as well as recipes for making some widely popular fruit products.

CURRANTS AND GOOSEBERRIES.

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With contributions by others.

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REGIONS WHERE CURRANTS AND GOOSEBERRIES CAN BE GROWN.

BOTH CURRANTS AND GOOSEBERRIES are natives of cool, moist northern climates and in the United States succeed best in the northern half of the country and east of the one hundredth meridian. They are injured by the long hot summers of the Southern States, except in the higher altitudes of the Appalachian Mountains. Even in Missouri and Kansas they do not succeed very well. They are not adapted to the hot interior valleys of California, but are grown in the northern coast counties of that State. Figure 1 shows the approximate southern boundary of the commercial culture of these fruits.

Gooseberries are grown slightly farther south than currants and seem to endure the summer heat somewhat better. More spraying, however, is necessary to keep the foliage of currants and gooseberries in a healthy condition in the southern part of their range than in the northern part.

Currants and gooseberries are very hardy and withstand extremely low temperatures; in fact, if windbreaks are provided, most varieties are able to withstand the severe conditions in most parts of the upper Mississippi Valley and the northern Great Plains area.

In the region west of the one hundredth meridian limited rainfall restricts their culture materially, except in irrigated sections and in comparatively small areas in northern California, the Willamette

Valley, and the Puget Sound region. The approximate boundaries of these areas are shown in figure 1.

Four factors limit the growing of currants and gooseberries in the United States: The white-pine blister rust, the currant maggot, the lack of moisture, and the heat of summer.

The blister rust makes it necessary to eradicate currant and gooseberry plants already growing and to prevent new plantings wherever the white pine is an important forest tree and there is danger of that disease being spread to valuable forest areas (see p. 22). The

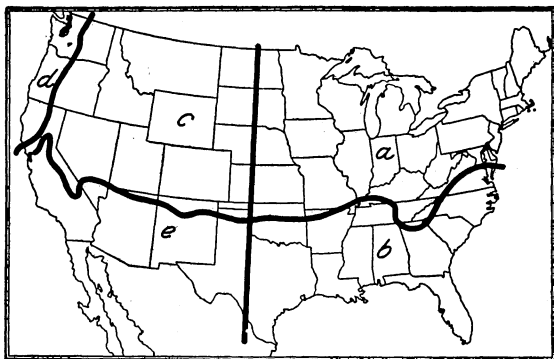


FIG. 1.—Map of the United States, showing the regions where currants and gooseberries may be grown. The area marked *a* is naturally best adapted to currants and gooseberries; in *b* the summers are too long and too hot for these fruits; in *c* low rainfall limits their culture except under irrigation, though these fruits are planted in many dry-land fruit gardens throughout this region. Although the area marked *d* has sufficient rainfall for these fruits, most of the rain occurs during the winter months and the moisture must be carefully conserved, while *e* is both too dry and too hot in summer. The boundaries of these areas are not sharply defined, but grade imperceptibly into each other.

map shown as figure 1 outlines the areas where these plants may be grown.

The fruit worms, especially the currant maggot, are very serious pests on currants and gooseberries in the Mountain and Pacific Coast States and have made the production of these fruits difficult in many sections there. The currant maggot, for which there is no known means of control, occurs also in some localities in the Eastern States. Some

very productive and profitable plantations may be found in the area designated as *c* in figure 1, and small plantings are scattered throughout the whole area, but until local conditions have been investigated currants and gooseberries should not be planted commercially in that part of the country.

SOIL AND SITE FOR A PLANTATION.

The soil selected for the currant and the gooseberry should be cool, well drained, and fertile. The heavy types, such as silt or clay loams, are usually better in these respects than sandy soils. Neither fruit will do well on land where water stands during any part of the year.

In regions toward the southern limit of their culture it is best to select a northern or northeastern slope, in order to give some protec-

tion from the sun. The north side of a building may be selected when only a few plants are to be grown for home use.

A place with good air drainage is preferred for gooseberries. In low, damp places mildew attacks both fruit and foliage more severely than on higher sites where the air circulation is better. Currants, however, are seldom severely attacked by mildew. Therefore, when the site is a sloping one, currants may be planted on the lower parts and gooseberries above. As both fruits blossom very early in the spring, neither should be planted in low pockets where late spring frosts may kill the flowers.

PREPARATION OF THE SOIL.

Before planting, the soil should be prepared as for garden crops. This includes deep plowing and thorough harrowing. Recently plowed sod land should not be used as a rule, because the sod will interfere with the setting of the plants and the management of the plantation until it becomes completely rotted. Sod land plowed early in the autumn and replowed and harrowed the following spring will usually be in good condition for planting, as will land in a good state of fertility following a crop of potatoes, tomatoes, or some other hoed crop.

PROPAGATION OF THE PLANTS.

Plants of the varieties desired generally can be secured from reliable nurserymen at small cost, and this is a satisfactory way to obtain them either for the home fruit garden or for commercial plantings. They may be propagated in the home garden, however, by means of layers or cuttings.

Gooseberries ordinarily are propagated by mound layers. The plant from which layers are to be procured should be cut back heavily before it begins to grow in the spring. By July it will have sent out numerous vigorous shoots. It should then be mounded with earth half way to the tips of the shoots, as shown in figure 2. By autumn the shoots will have rooted. Those with strong roots may then be cut off and set in the nursery, to be grown for one or two years before planting in the field. If the roots are not well developed, it will be better to leave the shoots attached to the parent plant for a second year. They will make strong root systems meanwhile, and then, if grown for a year in the nursery, after being cut from the parent plant they will be satisfactory for planting. The latter method is more common in the case of European varieties, which do not root so readily as American sorts.

A few varieties of gooseberries are propagated more easily by cuttings than by layers. Those varieties which are of European parent-

age are generally the most difficult to propagate by cuttings. American sorts vary greatly in this respect, however. Thus, cuttings of the Houghton variety root readily, while those of the Downing do not. Two new and as yet little-known varieties, the Poorman and the Van Fleet, are easily propagated by cuttings. If cuttings are used, they should be of the current season's growth and about 8 inches long, and



FIG. 2.—A field of gooseberries mounded for propagation by layers. About July 1 the bushes are mounded with soil at least half way to the ends of the branches, following which roots begin forming along the branches. All those which are well rooted may be cut off from the parent plant in the autumn or following spring and grown in the nursery row for one season, or perhaps two seasons, before being permanently planted. (Photographed at Fredonia, N. Y., August 10, 1917.)

they should be handled in accordance with the directions given below for current cuttings.

Currants are propagated almost entirely by means of cuttings made from vigorous shoots of the current season's growth. In the Eastern States cuttings are made about 8 inches long and in the Pacific coast regions from 10 to 12 inches long. They are usually cut in the autumn after the leaves have dropped and may be set in the nursery row immediately, or buried in sand with the bottom end up, or stored until spring in a cellar cool enough to keep them dormant and moist enough to pre-

vent drying, but not so moist as to cause mold to develop on them. The cuttings may also be made during the winter or in early spring. In the latter case they are put in the nursery at once. The cuttings should be set from 3 to 6 inches apart in the nursery row, with the soil firmly packed about them. This is done as early in the spring as the soil can be worked, whether the cuttings are made in the autumn or later. Not more than two buds should be left above the ground. Figure 3 shows cuttings placed in a trench ready to

have the soil packed about them. At the end of one or two seasons they should make plants satisfactory for setting in the field. Figure 4 shows a currant bush used for propagation. All the new wood is removed each year to make cuttings.

HANDLING NURSERY STOCK.

Only strong 1-year-old or 2-year-old plants should be used for field planting. Unless the plants can be set at once upon arrival from the nursery, the bundle should be opened and the plants separated and heeled in, as shown in figure 5. This will protect the roots from drying. If the roots are very dry when the plants are received,

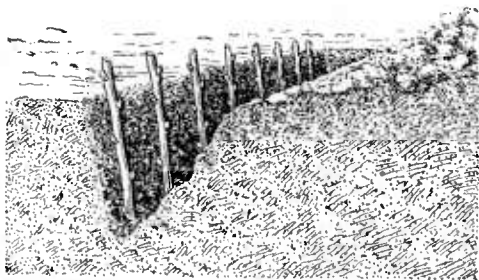


FIG. 3.—Cuttings set in trench.



FIG. 4.—A Cherry currant bush at Fredonia, N. Y., the entire annual growth of which has been cut off each year at the surface of the ground for use as cuttings. This practice insures the maximum growth of new wood for cuttings the following year. Nurserymen may get as many as a hundred cuttings from a single bush. (Photographed August 10, 1917.)

they should be soaked for several hours before heeling in. Figure 6 shows a bundle of gooseberry plants as received from the nursery.

TIME TO PLANT.

In most sections plants may be set either in the autumn or spring, but in northern Iowa and Nebraska and the States north of them

only spring planting should be practiced. Both currants and gooseberries start growth very early in the spring, and if nursery stock can be secured in the autumn that season is preferred for planting except in the section just mentioned. In order that the roots may

be thoroughly established in the soil before winter, the plants should be set as early as it is possible to obtain them in a dormant condition. Currants may be planted as early as the



FIG. 5.—One-year-old Fay currants heeled in. Nursery stock may be kept in this way for a considerable period of time. (Photographed March 31, 1916.)



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middle of September in the Northern States, except as noted above, and gooseberries as early as October 1. It is often difficult, however, to purchase plants for autumn setting.

DISTANCE TO PLANT.

The distance between the rows depends on the method of tillage. If a 1-horse cultivator is to be used, the rows should be set 6 feet apart, while for a 2-horse cultivator the rows should be 8 feet apart.

The distance between the plants in the rows depends to a considerable extent on the variety. If the bushes are of a variety that does not grow large, they may be set as close as 4 feet, while if the bushes are naturally large when fully grown or the ground is very rich 5 or 6 feet apart is preferred. The bushes of the Wilder, London, and some other red currants and of all black currants grow larger than those of the Perfection, Fay, and Red Cross varieties and should be set farther apart in the row. Therefore, if in any section Red Cross bushes are commonly set 5 feet apart in the row the Wilder bushes should be at least 6 feet apart.

The Downing, Houghton, Oregon, and Poorman gooseberries have larger bushes than most others. They may be set 4 or 5 feet apart in soil of ordinary fertility, but in very fertile soil they will need to

be 6 or 7 feet apart. Gooseberry bushes of European parentage usually do not grow as large as those mentioned, which are believed to be at least partly of American ancestry, and it is rarely necessary to set them more than 5 feet apart.

DIRECTIONS FOR PLANTING.

Before planting, all broken roots should be cut off and the top cut back to stand about 6 inches above the ground. If the plants have especially strong root systems the tops may be left 10 to 12 inches high. The plants should be set somewhat deeper than they stood in the nursery. If they do not branch naturally near the surface of the ground, they should be set so deep that the lowest branch starts just below the surface of the soil. This will cause them to take the form of a bush instead of a small tree.

The soil must be packed firmly about the roots with the foot as the plants are set. Without such packing the roots may dry out and the plants die.

In friable soils, such as fine sandy loams, the hole for planting may be made by forcing a spade straight down and then pressing it forward. The roots are thrust into this hole, the spade withdrawn, and the soil firmed about them. Plants can be set very rapidly in this manner. In heavy soils holes may have to be dug with a spade



FIG. 6.—A bundle of 27 good plants of the Carrie gooseberry as received from the nursery.

before planting. The cost is then much greater than by the former method, but unless the holes are dug the clay may harden about the roots so that the plants will never grow well.

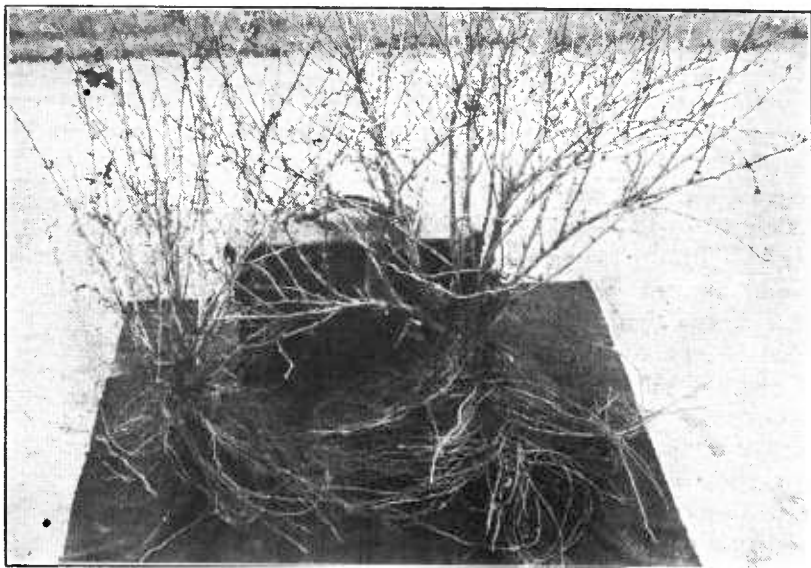


FIG. 7.—An old gooseberry plant (at the right), showing the character of its root system. The plant at the left grew from the tip of a branch of the older plant, which was covered with soil. (Photographed September 26, 1916.)

TILLAGE AND MULCHING.

Tillage should begin soon after the plants have been set and should be continued at frequent intervals throughout the growing season or until a green-manure crop is planted. The tillage should be deeper the first year than later.



FIG. 8.—A horse hoe which may be used to advantage in currant and gooseberry plantations.

Both currants and gooseberries usually are shallow rooted, and care must be taken not to injure the roots in tillage. If a cultivator is run rather deep the first year the roots may be made to grow some-

what deeper than they otherwise would. The first spring cultivation should be deeper than later ones. Growers sometimes use a plow at this time.

Figure 7 shows the root systems of gooseberry plants grown on land properly tilled. Some of the roots were not more than 6 inches below the surface, but many were over a foot deep.

If plants are set 5 or more feet apart each way a horse cultivator may be used, and very little hand hoeing will be necessary. If they are set so that the cultivator can be run in one direction only and the rows are 7 or 8 feet apart, a horse hoe, such as is shown in figure 8, may be used. This is easily guided, and if used in connection with the cultivator will reduce the amount of hand labor very considerably.

A mulch of straw or wild hay is sometimes advised for currants and gooseberries. It conserves moisture, keeps down weeds, and takes the place of tillage. Mice are likely to multiply in mulched fields, however, and girdle the plants; in fact, the injury from this source is so often serious that growers rarely use a mulch.

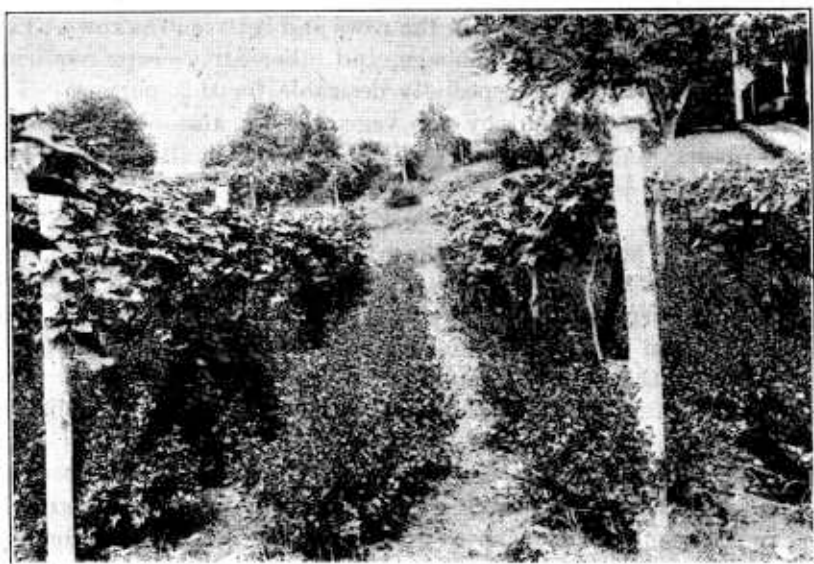


FIG. 9.—Gooseberries interplanted in a vineyard at Marlboro, N. Y. A row of gooseberries is set between the rows of grapes and another row under the grape trellis. These grape rows are 9 feet apart. (Photographed July 20, 1917.)

INTERPLANTING AND INTERCROPPING.

Gooseberries and currants frequently are interplanted in orchards or vineyards. Figure 9 shows gooseberries in a vineyard.

When interplanted in cherry orchards gooseberries and currants may be left for several years, according to the growth of the orchard and the size of the bushes; and in apple and pear orchards they may be left somewhat longer, though the ground occupied should be restricted to one or two rows of bushes through the center of the space between the tree rows. Otherwise, the bushes will be likely to interfere with the proper care of the trees. In vineyards the currants and gooseberries are often made a part of the perma-

nent plantation, but while they are commonly productive when so grown, the grapes are likely to be rather unproductive.

In gardens where the available land is limited in extent, currants and gooseberries may well be planted among the tree fruits and left there permanently. The shade of the trees protects the fruits from sun scald, and the foliage is usually healthier in such locations than when grown where it is freely exposed to the sun. The shade afforded by the fruit trees will be especially beneficial in southern sections, and the currants and gooseberries should be even more productive than if planted by themselves.

When currants and gooseberries are not grown in orchards they may be intercropped for the first two years; that is, vegetables may be grown between the plants in the rows and between the rows. Lettuce, early potatoes, early cabbage, and other early crops requiring intensive cultivation are especially desirable for this purpose. The thorough tillage required by the vegetables is also needed by the berry plants, and the intercrop will often pay for all expenses connected with the care of the plantation.

MAINTENANCE OF FERTILITY.

Both the currant and the gooseberry respond well to the use of fertilizers, even when planted on fertile soils. Their use, however, is governed by the same principles that apply to other crops. The kinds and quantities of the different plant foods that can profitably be used depend on the physical condition of the soil and the plant foods already available in it. The needs in any particular case can be determined only by applying the different plant foods separately and in different combinations to different parts of the plantation and noting the results. Thus, while stable manure and wood ashes can be used in liberal quantities and will generally prove profitable, each grower must determine for himself the amounts that will give the best results on his soil. In like manner the kind and quantities of commercial fertilizer to be used must be determined.

In places where a supply is available, 10 to 20 tons of stable manure per acre each year may be found profitable, and some successful growers use even larger quantities. Many use hen manure. Larger quantities of this may be applied safely to gooseberry plantations than to currants.

In many sections green-manure or cover crops may be used to keep up the humus supply. The seed is sown or drilled in between the rows early enough to allow good growth before winter, and the crop is plowed under early the following spring. If this practice is followed, less stable manure or commercial fertilizer will be needed.

The green-manure crops should be those best adapted to local conditions. Preferably, however, they should consist of legumes or a combination of legumes and nonleguminous plants.

PRUNING THE BUSHES.

Currants and gooseberries naturally form bushes with many branches which start out near the surface of the ground, as shown in figure 10. Too many branches are usually formed. Pruning in a new plantation consists in removing the superfluous ones. It is only rarely that the branches are headed back. The pruning should be done during the dormant period. If not done following the dropping of the leaves in autumn, it is frequently delayed until spring, shortly before growth starts.

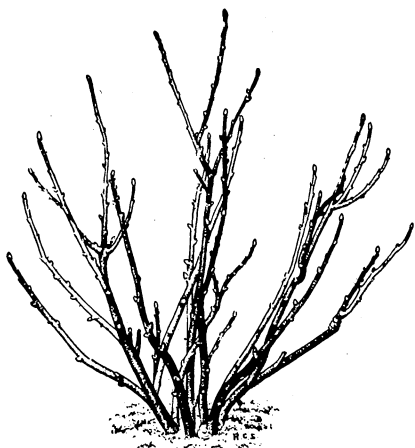


FIG. 10.—A black currant bush before pruning.

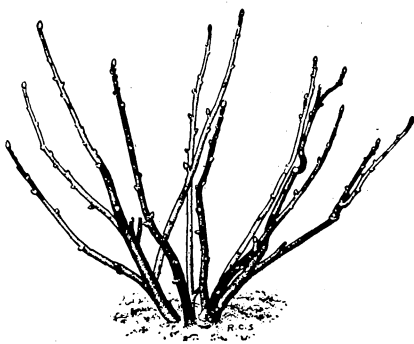


FIG. 11.—The black currant bush shown in figure 10 after pruning. The canes left are all 1 and 2 years old.

PRUNING CURRANTS.

Red or white currant bushes which are 1 year old should have the weaker shoots removed, leaving six to eight strong shoots, according to the vigor of the bush. At the end of the next year four or five 2-year-old shoots and three or four 1-year-old shoots should be left, and at the end of the third year about three shoots each of 3-year-old, 2-year-old, and 1-year-old wood.

The red and white currants bear their fruit at the base of 1-year-old wood and on spurs on older wood. They bear best on spurs on 2-year-old and 3-year-old wood. Pruning bearing bushes after they are more than 3 years of age consequently consists in removing all branches more than 3 years old and which have passed this heavy bearing period, leaving just enough 1-year-old shoots to take their places. Pruning, therefore, in effect is a process of renewal.

In pruning varieties of spreading growth the outer and lower shoots generally should be removed, as these branches are likely to droop to the ground and the fruit borne on them be covered with dirt. Varieties of very erect growth, on the other hand, should be thinned by the removal of the central shoots.

Black currants bear well on 1-year-old wood. In pruning them wood that has borne two years should be removed and new wood left to replace it. -Most, if not all, black varieties have an erect habit of growth, and the bushes should be thinned by removing some of the central canes. From six to eight branches are usually left on each plant. Within certain limits the heavier the pruning the larger and

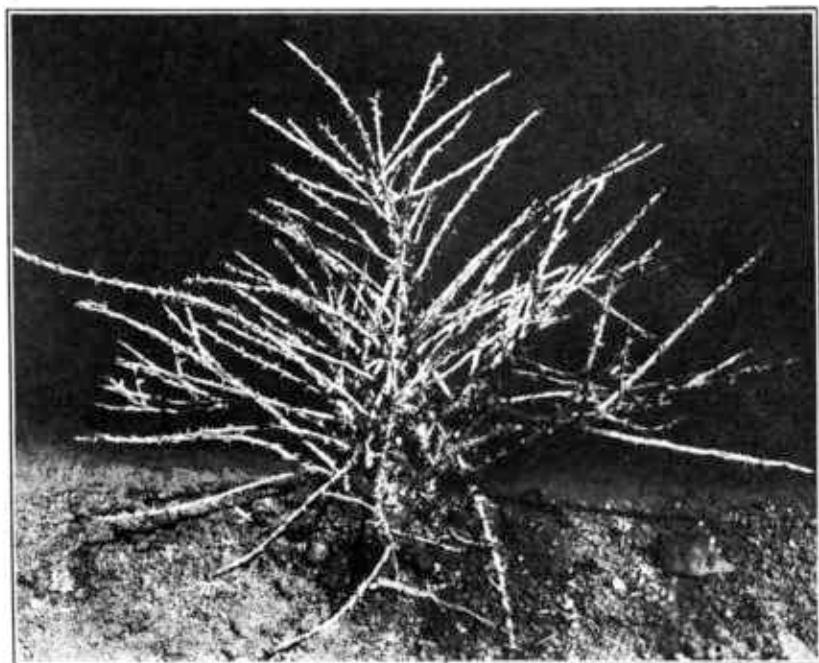


FIG. 12.—A gooseberry bush before pruning. (Compare figure 13.)

better the fruit, yet care is necessary not to go to extremes. Figures 10 and 11 show a black currant bush before and after pruning. These figures also illustrate the plans described above for pruning red currants.

PRUNING GOOSEBERRIES.

The general principles of currant pruning apply also to gooseberries. The fruit is produced on 1-year-old wood and on 1-year-old spurs of older wood. Pruning consists in removing branches after they have borne fruit for two years and allowing new shoots to

replace them. On the Pacific coast, however, the practice is to allow a branch to fruit for three years before removing it. It is said in that region that the canes are most productive the third year, after which they should be removed. If the side shoots become too numerous, enough of them should be cut out to form a fairly open head. Branches which have borne heavily tend to droop, and these, as well as all other drooping branches, should be removed.

Figures 12 and 13 show a 1-year-old gooseberry bush before and after pruning, while figures 14 and 15 show an older gooseberry bush before and after pruning. This bush was so vigorous that more than nine branches were left.

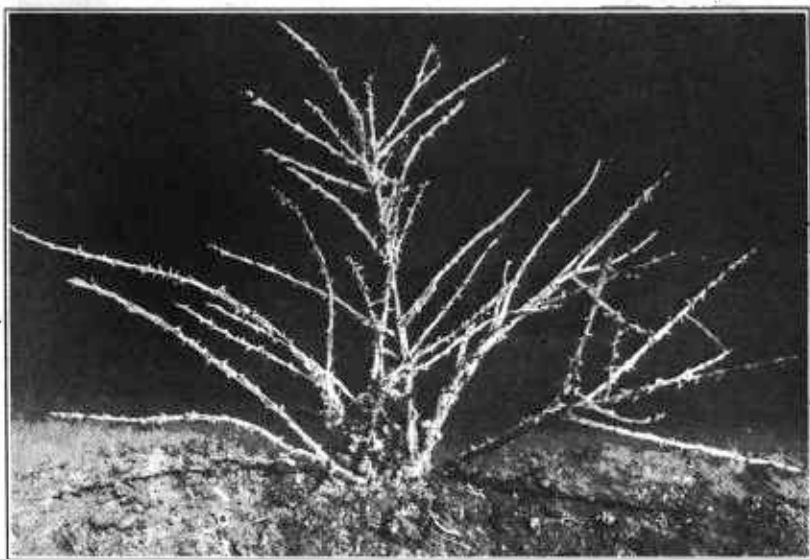


FIG. 13.—The gooseberry bush shown in figure 12 after pruning. All branches lying on or close to the ground have been removed and those remaining have been thinned out.

Plantations of gooseberries trained to the tree form, where all the branches start from a main stem at a height of 1 or 2 feet above the ground, have been comparatively unproductive in the United States. As the bush form, where all the branches start from the root at or just below the surface of the ground, is more productive, and as the gooseberry naturally grows in that form, it is the only one discussed here.

Figure 16 shows a gooseberry plant grown in the tree form and figure 17 one in bush form.

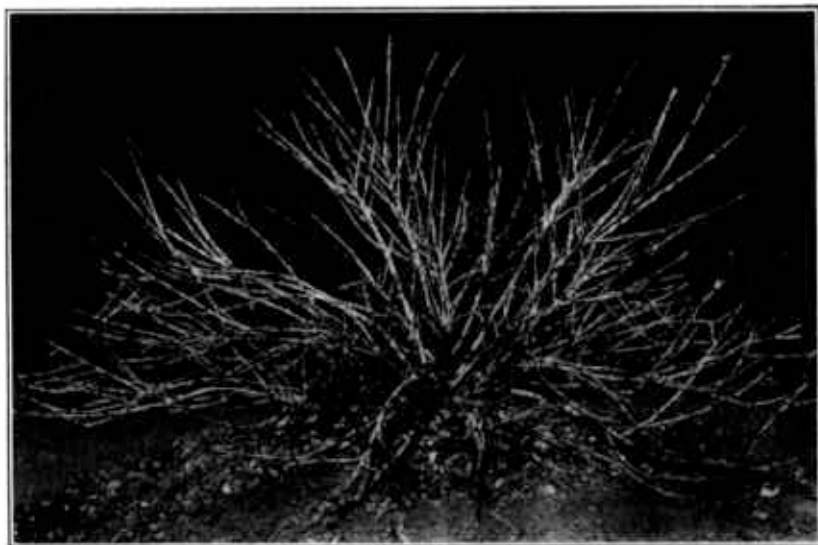
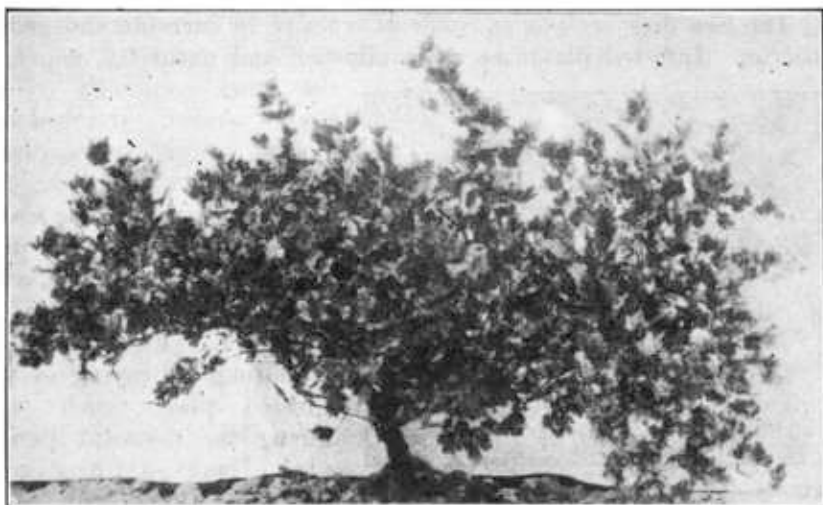


FIG. 14.—A 2-year-old bush of the Van Fleet gooseberry before pruning. See figure 15. (Photographed October 22, 1915.)

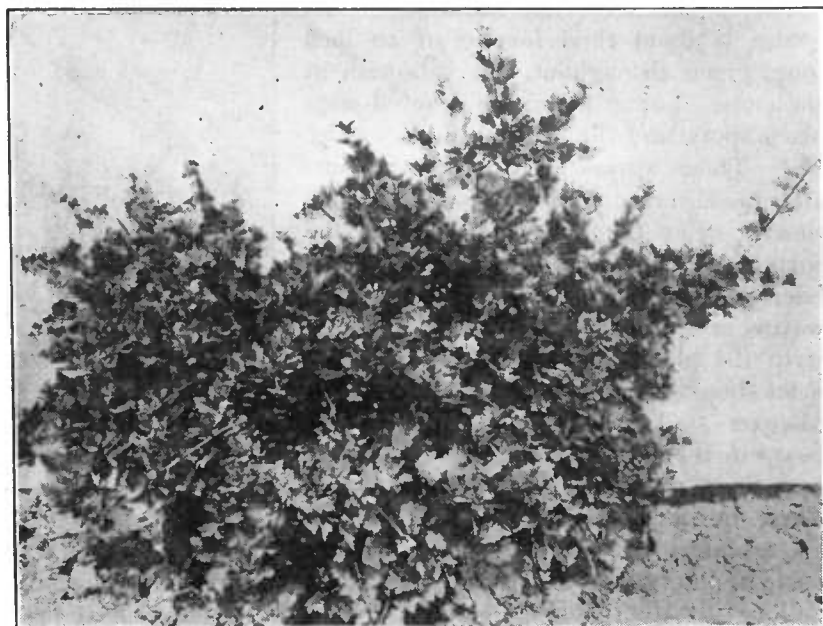


FIG. 15.—The 2-year-old Van Fleet gooseberry bush shown in figure 14 after pruning. The branches lying on the ground were removed and the top thinned. (Photographed October 22, 1915.)



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FIG. 16.—A plant of the Jolly Angler gooseberry at Geneva, N. Y., trained to the tree form. This form is not as desirable as the bush form shown in figure 17. (Photographed July 23, 1917.)



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FIG. 17.—A plant of the May Duke gooseberry at Geneva, N. Y., trained to the bush form. The branches start at or below the surface of the ground. (Photographed July 23, 1917.)

INJURIOUS INSECTS.¹THE SAN JOSE SCALE.²

The San Jose scale is at times destructive to currants and gooseberries. Infested plants become yellowish and unthrifty, many of



FIG. 18.—The San Jose scale. (Much enlarged.)

the canes eventually dying. Plants seriously attacked will have a grayish appearance, as if coated with ashes. Individual mature female scales are about the size of a pin-head, circular in outline, with a nipplelike prominence in the center. (Fig. 18.)

Thorough spraying of the infested plants each year during the dormant period with lime-sulphur concentrate, at the rate of 1 gallon to 7 or 8 gallons of water will keep under control these insects, as well as the oyster-shell scale, also common on currants.

THE IMPORTED CURRANT WORM.³

The imported currant worm when full grown is about three-fourths of an inch long, green throughout, but yellowish at the ends. Young larvæ are covered with black spots, and the head is black. (Fig. 19.) These worms attack both currants and gooseberries, appearing on the plants shortly after the leaves are out in the spring and feeding at first in colonies, but later scattering over the plants. Currant worms are voracious feeders and quickly strip the plants of foliage; hence, treatment should be given promptly upon their discovery. Another brood of larvæ appears in the early summer, and some seasons there may be a partial third brood. These insects are destroyed readily with an arsenical (such as arsenate of lead paste at the rate of 2 pounds, or in powder form at 1 pound, to 50 gallons of water), sprayed or dusted over the plants. Effort should



FIG. 19.—The imported currant worm and its injury to currant leaves.

¹ Prepared by A. L. Quaintance, entomologist in charge of deciduous-fruit insect investigations, Bureau of Entomology.

² *Aspidiotus perniciosus* Comstock.

³ *Pteronous ribesii* Scopoli.

be made to destroy the first brood and prevent later injury. In treating the second brood when the fruit is ripening, powdered hellebore should be used, diluted 5 to 10 times with flour or air-slaked lime, or as a spray, 1 ounce to 1 gallon of water.

THE CURRANT APHIS.¹

The currant aphid curls the terminal leaves of the currant and gooseberry, especially the red currant, its presence resulting in little pits or pockets on the lower leaf surface. (Fig. 20.) A reddish color usually develops on the upper surface of injured leaves, which is visible some distance away. This aphid is easily controlled by spraying the plants as the leaf buds are opening in the spring, thus destroying the young stem mothers. The 40 per cent nicotine sulphate at

the rate of 1 part to 800 or 1,000 parts of soapy water should be used, or kerosene emulsion or fish-oil soap wash may be used instead. Where the nicotine is used in small quantities, 1 teaspoonful to a gallon of water, or 1 ounce to 8 gallons makes the right proportions. In spraying later in the season the liquid should be directed against the insects on the lower surface of the leaves.



FIG. 20.—Currant leaves curled by the currant aphid.

THE IMPORTED CURRANT BORER.²

The larvæ of the imported currant borer attack the canes, principally of the currant, eating out the pith, the hollows or burrows often being several inches in length. The injured canes in the spring put out a sickly growth, owing to their weakened condition, and may break from the action of the wind.

The parent insect is a handsome clear-winged moth, with a wing expanse of about three-fourths of an inch. These insects are out during June and deposit singly on the plants their brownish, round eggs. The resulting larvæ bore into the canes, tunneling up and down as they grow, becoming nearly full grown by fall, when they are about one-half inch long, whitish in color, the head and legs brown. The larvæ hibernate in their burrows, complete their growth

¹ *Myzus ribis* Linn.

² *Scesia tipuliformis* Clerck.

the following spring, and then pupate. In May or early June the moths emerge, completing the life cycle of the insect.

This pest is best controlled by cutting out and destroying in the spring the sickly and weakened canes. If this work be carefully done each year it will aid much in keeping the insects reduced below injurious numbers.

THE YELLOW CURRANT FLY.¹

The maggot of this small pale yellowish fly infests the fruit of both the currant and gooseberry, causing it to color prematurely and usually fall to the ground. Infested berries generally show a discolored spot at the place punctured by the female in depositing the egg or marking the location of injured seeds. This insect occurs over the northern United States and Canada, but is more troublesome in the West, where in some regions it is practically a chronic pest. The maggots require about three weeks to complete their growth. Then they desert the berries either while these are hanging on the plants or after they have fallen to the ground, change to the pupal stage at or below the ground surface, and remain in this condition until the spring following, when the adults appear and deposit eggs in the developing fruit.

No practical method of controlling this pest is known. Benefit, of course, according to the thoroughness with which the work is done, will follow the careful removal from the bushes and the destruction of the prematurely ripening fruit.

DISEASES.²

The fungous diseases of the currant and gooseberry are much the same and are rather generally distributed throughout the areas where these plants are grown. Descriptions of the most important diseases follow.

CURRANT DISEASES.

Cane wilt.—The fungus³ causing cane wilt usually enters the plant through a terminal or lateral bud or a small branch on a cane and soon reaches the main stem, completely cutting off the water supply of the upper part and causing the leaves and fruit to wilt and die. The death of the cane may occur at any time during the growing season, but is most frequent and conspicuous about the time the fruit is ripening. This disease at present appears to be confined chiefly to New York and New Jersey. No noticeable difference in the susceptibility of different varieties has been observed.

¹ *Epochra canadensis* Loew.

² Prepared by C. L. Shear, pathologist, Office of Fruit Disease Investigations, Bureau of Plant Industry.

³ *Botryosphaeria ribis* Gross. and Dug.

Treatment.—The attempts to prevent or control this disease have thus far not been very satisfactory. A combination of eradication and spraying is the best treatment that can be recommended. As a sanitary measure, at least, all diseased canes should be cut out and destroyed by burning as soon as discovered, and in the fall all canes dead and dying from any cause should be removed and burned. In addition to this, the spray treatment with Bordeaux mixture given later in the spray schedule for anthracnose and leaf-spot should help to prevent new infections. The dormant spray with lime-sulphur for scale insects should also be helpful.

Anthracnose.—Anthracnose is caused by a parasitic fungus¹ which at first produces numerous small brownish spots thickly scattered over the upper surface of the leaves. As the disease progresses, the leaves turn yellow and drop. In severe cases the bushes may be defoliated before the fruit has ripened. Sometimes also the fruit stalk and fruits are attacked by the fungus. In less severe cases the foliage may not fall until after the fruit has matured. The canes, however, do not mature properly in either case and are much weakened and more liable to winter injury and fungous diseases than normal vigorous canes. Some varieties are more subject to attack by this disease than others. The Albert (*Prince Albert*) and the Wilder varieties are said to be usually free from attack, while the Fay and the Victoria are likely to be badly affected.

Treatment.—The dormant spray with commercial lime-sulphur, 1 to 10, as commonly used for scale insects, is very helpful in controlling anthracnose. During the growing season the plants should be sprayed with Bordeaux mixture in accordance with the spray schedule on a following page. In severe cases it may be necessary to spray after the fruit has been picked, in order to prevent premature defoliation. Spraying just before the fruit is ripe may result in staining and necessitate washing.

Leaf-spot.—Leaf-spot² is characterized by the appearance of irregular spots, having a pale center and brownish purple margins. Minute brownish black pustules of the fungus are produced on the under sides of the spots on the leaf. These pustules are the fruiting bodies of the parasite. The spots may become so numerous on the leaves that the plants are more or less defoliated. This trouble is not often as serious as in the case of anthracnose, and the leaves do not usually fall until late in the season. Where there is defoliation, however, there is injury to the plant and a decrease in its productivity.

Treatment.—The treatment for leaf-spot is the same as that for anthracnose, as given in the spray schedule.

¹ *Pseudopeziza ribis* (Lib.) Kleb.

² *Septoria ribis* Desm.

Angular leaf-spot.—Angular leaf-spot¹ is usually less frequent and less serious than the other leaf troubles. The spots produced by the fungus are scattered, roundish, or angular, and ashy or whitish.

Treatment.—The spray treatment recommended for anthracnose will also prevent angular leaf-spot. (See spray schedule.)

Powdery mildew.—Besides the above diseases, powdery mildew² of the gooseberry sometimes occurs on the currant, but it is rarely of sufficient importance to require treatment.

GOOSEBERRY DISEASES.

Powdery mildew.—Powdery mildew² is not usually severe on American varieties of the gooseberry. It is most serious on European varieties or hybrids with European varieties. The fungus first appears in the form of a white, more or less powdery growth on the young leaves and shoots as well as fruit. As it develops further it forms a thin, felty, reddish brown coating of fungous filaments on the fruit, foliage, and stems.

Treatment.—The most satisfactory treatment for powdery mildew is commercial lime-sulphur, 1½ gallons to 50 gallons of water. Three or four applications should be made, beginning as soon as the leaf buds begin to open and repeating at intervals of 10 to 14 days. Where the attack is severe, the cutting out and burning of the diseased tips of the canes should be practiced, as the fungus lives over winter in these diseased parts.

Anthracnose.—Anthracnose³ of the gooseberry is caused by the same fungus and presents the same general appearance as anthracnose of the currant. It is, however, usually less serious on the gooseberry.

Treatment.—Spraying with Bordeaux mixture, in accordance with the directions in the spray schedule for currant anthracnose, will control this disease.

Leaf-spot.—Leaf-spot⁴ has practically the same appearance on the gooseberry as on the currant and is caused by the same fungus. It sometimes defoliates the plants.

Treatment.—It can be controlled by giving the treatment directed in the spray schedule for currant leaf-spot.

WHITE-PINE BLISTER RUST.⁵

The invasion of North America by the white-pine blister rust has brought about in many States new laws and quarantines regulating

¹ *Cercospora angulata* Wint.

³ *Pseudopeziza ribis* (Lib.) Kleb.

² *Sphaerotheca mors-uvae* (Schw.) B. and C.

⁴ *Septoria ribis* Desm.

⁵ Prepared by S. B. Detwiler, forest pathologist in charge of the Office of Blister-Rust Control, Bureau of Plant Industry.

the shipment, planting, or possession of currants and gooseberries. During the next few years similar restrictions are likely to be in effect in other States and in other areas within States which at present have such laws. The cultivation of currants and gooseberries in the pine-growing regions, particularly the New England States, New York, Wisconsin, and Minnesota, should be limited to such localities as are approved by the State agricultural and forestry departments. The cultivated black currant should not be grown in any white-pine region, because of its extreme susceptibility to this disease.

White-pine blister rust was brought into the United States on nursery stock from Europe and is permanently established in the East. Infection is general in the New England States and in the eastern Adirondack region of New York and has extended over a large area in Wisconsin and Minnesota. Isolated spots where the disease exists have been found as far south as New Jersey and Pennsylvania and as far west as South Dakota. White-pine blister rust was found west of the Great Plains area in 1921. The infected area appears to be limited to the Puget Sound sections of Washington and British Columbia.

The white-pine blister rust is a fungus which grows on the leaves of currants and gooseberries and then attacks and kills 5-needled pines. The best regions for the growing of currants and gooseberries in most cases are also the regions in which white pines are native and climatic conditions favorable to the development of the parasite. If the disease is present in localities where it is desirable to continue the growing of white pines, it is a necessary step in control to destroy all currant and gooseberry bushes (both cultivated and wild) within 600 to 900 feet of the pines.

The blister rust first attacks the twigs of a pine tree and then gradually works into the larger branches and the trunk. It kills by girdling the bark. Fortunately for its control, the blister rust can not go directly from one tree to another. It requires a period of incubation on the leaf of the currant or gooseberry, where it undergoes several changes, before it can again attack pines.¹ Its growth on currants and gooseberries is so vigorous that by the end of a growing season it may have spread to most of the bushes within a radius of several miles of the infected pines on which it originated. When white pines grow near infected currants or gooseberries the disease passes back and forth from one host to the other until all of the trees are hopelessly diseased.

¹ For a complete description of this disease, see Farmers' Bulletin 742, entitled "The White-Pine Blister Rust."

No species or variety of currant or gooseberry appears to be immune to the rust. Cultivated black currants are especially susceptible. Spraying has not proved practical or successful in preventing infection or in killing the fungus after it attacks the currant or gooseberry leaves. Ordinarily, the bushes are not killed by the disease, but plants which are heavily infected lose their leaves in midseason and crop production is reduced accordingly.

For practical control of this disease it is necessary to remove immediately either all 5-leaved pines or all currants and gooseberries from the region. Experience has proved that this disease can not be eradicated by cutting out only infected trees or parts of trees. If currant and gooseberry bushes are to be kept free from disease it is essential to remove all 5-leaved pines as soon as the blister rust appears in a district. To safeguard any particular group of pines when infection appears on currants and gooseberries, the only effective method is to uproot all currants and gooseberries, wild and cultivated (including ornamental, flowering, or "spice" currants), within 900 feet of the trees it is desired to protect. The removal of these bushes only when the disease is found on them is expensive, because of the frequent inspections which are required. It is, furthermore, ineffective, because it is practically impossible in actual work to make inspections thorough enough and often enough to detect all cases of disease, and some spores are almost certain to escape to the pines.

The general prevalence of blister-rust infection in New England and northeastern New York makes it necessary for these States to regulate the cultivation of currants and gooseberries in order to protect the pines. A number of States have enacted laws permitting State officials to destroy all cultivated currants and gooseberries in certain districts or in the entire State and to prohibit the future planting of currants and gooseberries in control districts. The purpose of these laws is to enable the owners of valuable white-pine woods to cooperate with the State officials in protecting them.

The New York law designates as "fruiting-currant districts" those sections of the State where the growing of currants for the production of fruit is an important commercial enterprise. The State conservation commission and the State department of agriculture are directed to designate the boundaries of such districts, and thereafter may prohibit the possession or planting of 5-leaved pines in these areas. In these districts, all currant and gooseberry bushes infected with the blister rust may be destroyed. Any wild or cultivated currants and gooseberries may be destroyed outside of the "fruiting-

currant districts," for the purpose of controlling the white-pine blister rust. This State also has declared all species of cultivated black currants (including flowering currants) a public nuisance and has prohibited their possession outside of the fruiting-currant districts.

Many States have quarantine regulations prohibiting the introduction of currant or gooseberry stock from designated regions. The Federal Horticultural Board also has placed an embargo on all currant and gooseberry plants from foreign countries, besides prohibiting interstate shipments in specified zones. It has been found that occasionally the blister rust infects the green stems of wild gooseberries as well as the leaves. The disease can overwinter on currant and gooseberry bushes. In this way currant and gooseberry nursery stock may be responsible for introducing the disease into new localities.

Undoubtedly other States where the white pine has a large present and potential value will follow the lead of New York and limit the propagation of currants and gooseberries to designated areas. In each locality the determining factor will be whether the currants and gooseberries are of greater value than the white pines. Since the white pines of the United States are estimated to be worth \$504,400,000 and those of Canada \$605,000,000 additional, it is felt that no chances of a further spread of the blister rust can be taken. The value of the young white-pine growth which will speedily succumb to a general infection of this disease is far in excess of the total value of the currant and gooseberry industry of the United States.

It is hoped to keep the white-pine blister rust out of the forests of the Rocky Mountain States through the Federal order prohibiting the shipment of any 5-leaved pines or currants or gooseberries from the Eastern States. Since the laws and quarantines relating to the shipment, planting, and growing of currants and gooseberries are likely to be changed frequently during the next few years, the prospective planter should communicate with the nursery inspector of his State before investing in nursery stock or establishing a plantation. A summary of the regulations governing shipment and planting of currants and gooseberries is given at the end of this bulletin.

SPRAY SCHEDULE.

DORMANT TREATMENT.

Just as the buds begin to swell, spray with lime-sulphur concentrate at the rate of 1 gallon to 7 or 8 gallons of water. This is for the control of the San Jose and other scales and is of some value in preventing fungous diseases.

FOLIAGE TREATMENT.

First application.—Just as the leaves are unfolding in the spring, spray with Bordeaux mixture, 4-4-50.¹ This treatment is for the cane wilt, anthracnose, and leaf-spot.

Second application.—Ten to twelve days after the first treatment spray with Bordeaux mixture, 4-4-50, plus 2 pounds of arsenate of lead paste (or 1 pound of arsenate of lead powder) to 50 gallons of spray. This is for the control of the fungous diseases mentioned and also for the imported currant worm.

Third application.—Twelve days to two weeks after the second treatment spray with Bordeaux mixture, 4-4-50, plus 2 pounds of arsenate of lead paste (or 1 pound of arsenate of lead powder) to 50 gallons of spray. This is for the control of the troubles mentioned under the second application. In gardens it will be safer to use hellebore than arsenate of lead to control the imported currant worm, especially at the time of this application. (See page 19 for directions.)

NOTE.—In cases where the powdery mildew is serious, dilute lime-sulphur concentrate at the rate of 1½ gallons to 50 gallons of water should be used instead of Bordeaux mixture, as previously stated.

DURATION OF A PLANTATION.

If a currant or gooseberry plantation is properly cared for, at least 8 to 10 crops may be expected before it becomes unprofitable because of its age. Productive fields over 20 years old are not uncommon in some sections. Although the number of years a plantation will continue in good bearing condition depends to some extent upon location and soil, the most important factor is the care which it receives. The period of productiveness of both currant and gooseberry plants is longer in northern regions than toward the southern limits of their culture and longer on heavy soil than on sandy soil.

HARVESTING THE CROP.

Currants and gooseberries may be left on the bushes for a long time after they are ready for use, from four to six weeks in the case of gooseberries, and with some varieties of currants even longer. For fruit which is to be marketed, however, the picking season is shorter, its length depending upon the variety.

Fruit which is intended for the general market should be picked and handled with great care. Injury to the skin furnishes an opportunity for the development of molds and bacteria which cause the

¹ Copper sulphate (bluestone), 4 pounds; stone lime, 4 pounds; water to make 50 gallons of spray.

fruit to spoil very quickly. There is also in the case of currants a leakage of the juice, which makes them unattractive and causes dust and dirt to adhere to them.

Quart baskets are often used as containers in picking. They may be set in hand carriers or in frames which are attached to the belt or suspended from the shoulders of the picker.

Currants should be picked by separating the stem of the cluster from the branches with the fingers, and not by grasping the clusters of berries and pulling them off. The berries are easily crushed and should never be pressed in picking. Certain varieties develop no berries at the base of the fruit cluster, that is, on the part next to the branch or spur, and these can be easily picked without danger of crushing. This is an especially desirable characteristic in a variety grown for market purposes.

When currants are to be used for making jelly they should be slightly underripe, as in that stage of maturity the berries contain more pectin (the substance in the juice of fruit which enables it to form jelly) than when thoroughly ripe. This is especially necessary with the Perfection, Red Cross, and other sorts which become rather mild flavored when fully ripe. If the fruit is to be spiced, stewed, or used for jam, it should be fully ripe when picked.

In this country gooseberries are usually picked before they are fully ripe. As soon as they are completely grown, which, in general, is about the time red raspberries begin to ripen, they may be picked for the canning factory or for jelly or jam making. When used for these purposes they may be stripped by hand, or a scoop resembling a cranberry scoop may be employed in picking. Gloves are worn when stripping the berries from the branches. In stripping, the berries are mixed with leaves, which are cheaply removed by passing through a grain-fanning mill, as shown in figure 21.

When gooseberries are intended for the general market they should not be stripped from the branches, as the sharp thorns cut many of the berries and these quickly spoil. Large-fruited berries must be handled with special care in order to avoid injuries. When fancy prices are secured for these large-fruited sorts, the bushes are sometimes picked over twice. After the full-grown berries are removed at the first picking, the small ones quickly increase in size and are ready for picking in a few days. They are usually marketed in quart baskets; more rarely in pint baskets.

In Europe large quantities of ripe gooseberries are eaten out of hand. Venders and fruit stores sell them in paper sacks and other containers, as cherries are sold in this country. In the United States, however, gooseberries are not commonly eaten without cooking, although many sorts are delicious when ripe and rank among the best dessert fruits. In fact, in this country gooseberries are most

commonly used in the green state for stewing and making jams, preserves, jellies, and pies. As gooseberries are of different colors when ripe and vary in their season of maturity, it will be necessary to learn by experience the proper time to pick each sort.

Gooseberries sun scald very quickly after picking and should be kept in the shade. Berries left in bright sunshine for half an hour or even less are likely to sun scald badly.

Figures 22 and 23 show crates of currants and gooseberries ready for market.

YIELDS OF FRUIT.

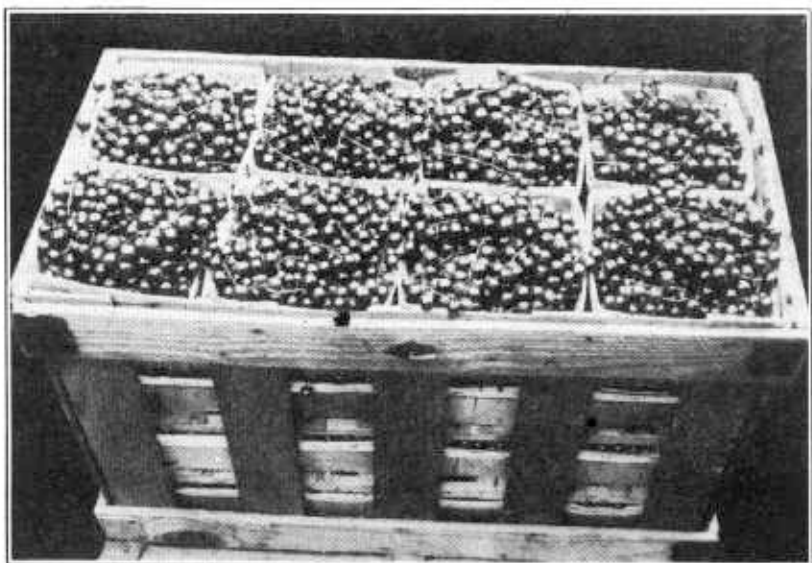
The currant as a rule bears abundant annual crops. Good plantations in full bearing should yield not less than 100 bushels per acre annually. Yields of 300 bushels per acre are exceptional, but have



FIG. 21.—A fanning mill through which gooseberries are passed as they are received from the pickers, for the purpose of removing the leaves that are mixed with them in harvesting the fruit. (Photographed June 16, 1915, at Rancocas, N. J.)

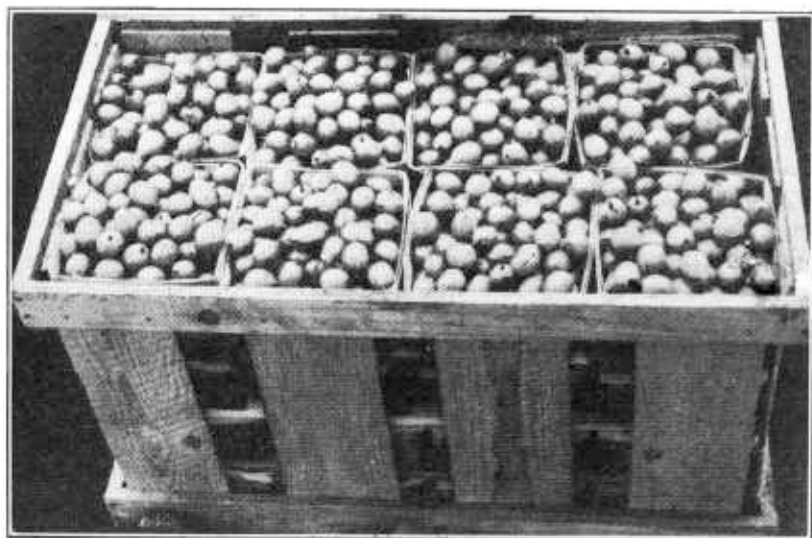
been recorded. Good plantations of gooseberries of European parentage should yield at least 100 bushels per acre. Those of American or partly American parentage are generally more productive, and yields of 300 bushels and more per acre are not unknown. European varieties, however, usually sell for much higher prices than American varieties.

Bushes in gardens usually receive more intensive cultivation than those in large plantations and therefore yield more as a rule. Currant bushes under garden conditions often yield from 5 to 10 quarts each, and gooseberries even more.



P 16685 HP

FIG. 22.—A 32-quart crate of Perfection currants ready for market. Note the relatively large size and long stems of this sort. (Photographed July 20, 1915, at Westwood, Mass.)



P 16731 HP

FIG. 23.—A 32-quart crate of Columbus gooseberries at Middle Hope, N. Y. Note the large size of this variety, which is one of the most desirable of the European sorts. (Photographed June 23, 1915.)

VARIETIES.

CURRANTS.

For commercial plantations vigorous, erect-growing, productive varieties should be chosen. The more acid varieties should be selected for jelly making and the milder varieties for dessert uses. The fruit should be large and firm and borne in compact clusters. Deep-red varieties are preferred for the market. For dessert use in the home the white currants are considered best.

The following varieties are suggested for the sections named: Perfection, Wilder, Red Cross, and White Imperial for the northeastern part of the United States; London (*London Market*), Wilder, Red Cross, and Perfection for Michigan and other parts of the Middle West; Perfection, London (*London Market*), Red Cross, Wilder, Fay, and Victoria for the Pacific coast.



FIG. 24.—Boxes of several varieties of currants, with clusters of each variety in the foreground. The varieties represented are (from left to right) the Lee (black), Albert (red), Champion (black), Margeson (white), and Perfection (red). (Photographed July 20, 1915, at Westwood, Mass.)

The varieties mentioned are suggestive only. In certain localities in the regions specified other varieties may be better adapted. The Fay, Perfection, Cherry, White Grape, Red Cross, and London have been found entirely hardy in North Dakota and should be hardy anywhere in the United States.

Most growers prefer to plant but one or two varieties. If two varieties are used, an early and a late one are selected.

Figure 24 shows the character of the fruit of several varieties of currants, while figure 25 shows a branch with the characteristic short clusters of the black currants.

RED VARIETIES.

Albert (*Prince Albert*).—Berries small to medium, very acid; hang on bushes well; season late. Clusters short, compact. Bushes very upright. One of the best varieties for jelly and preserves and the latest maturing sort listed here, except perhaps the Rivers.

Cherry.—Berries large, becoming smaller as the bush grows older; deep red; very acid; midseason. Clusters vary in length and compactness; not as easily picked as Fay. Bush somewhat spreading.

Diploma.—Berries very large, bright red, mild subacid; clusters easily picked. Bush upright; canes rather brittle. A promising comparatively new variety.

Fay.—Berries large, dark red, acid; early to midseason. Clusters with small berries at ends; easy to pick. Bush very spreading; canes break easily. Needs fertile soil. One of the leading varieties in New York.

Filler.—Berries large. Bush upright. Grown somewhat in the Hudson River Valley.

Franco-German.—Berries medium size, acid; season late. Clusters small, compact. Bush upright. Desirable for dry western climates.

London (London Market).—Berries medium to large, deep red, very acid; midseason to late. Clusters compact. Bush upright. Somewhat resistant to borers and diseases; reported as the most resistant of any variety to the white-pine blister rust. The best variety in many sections of the Middle West.



FIG. 23.—A branch of the Golden Prolife currant. This is a variety of the species *Ribes aurum*, which is native to western Kansas and Oklahoma, eastern Colorado, and surrounding regions. Varieties of this species are very productive under some conditions, but under other conditions are unproductive. (Photographed June 30, 1917.)

Perfection.—Berries large, bright crimson, sprightly subacid; midseason. Clusters compact, long, easy to pick. Bush upright; canes break easily. A very promising variety for all sections and the best variety in parts of the Northwest.

Red Cross.—Berries large, firm, light red, subacid, hang on bushes well; midseason, but later than Cherry. Clusters large, long, compact, very easy to pick. Bush somewhat spreading. A desirable variety in most sections, although cracking so badly at one point in the Hudson River Valley that it has been discarded. Not so good for jelly as others.

Rivers (Rivers Late).—Berries medium to large; hang on bushes well; season late. Clusters large. Bush large, upright, similar to that of Albert. A new sort. Promising because of its large fruit, which ripens late in the season.

Victoria.—Berries medium size, bright red, mild subacid; hang well on bushes. Clusters long, loose. Bush upright, large, very free from diseases and most

Insects, but susceptible to hot-weather injury in some sections; very productive and very hardy. The Victoria, Albert, Rivers, and London are especially good for prolonging the season.

Wilder.—Berries large, dark red, mild subacid; hang on bushes well; mid-season. Clusters large, compact, easy to pick. Bush upright and large. A desirable variety and hardy in all regions except the upper Mississippi Valley region.

WHITE VARIETIES.

White Grape.—Berries large, pale yellow, very mild flavor. Clusters loose and poorly filled. Bush spreading.

White Imperial.—Berries large, pale yellow, almost sweet. Clusters medium size. Bush spreading, very productive. A desirable variety; considered to have the best dessert quality of all currants.

BLACK VARIETIES.

Boskoop (*Boskoop Giant*).—This is a comparatively new currant of value. The berries are large, good in quality, and ripen evenly; the clusters are large for a black sort and pick easily; the bush is productive. One of the earliest black sorts.

Crandall.—Berries large, bluish black, with a characteristic flavor somewhat unlike other black sorts. Clusters rather small. Bush spreading. Succeeds in regions having hot summers. The Golden Prolific is a variety similar to the Crandall, but with golden fruit. The berries of both these sorts must be picked singly, as they do not all ripen at the same time.

Naples.—The fruit of this variety is smaller than that of the Boskoop, and it is not always productive. It is commonly grown, however.

GOOSEBERRIES.

As already stated, the American varieties of gooseberries are usually the most productive. They are hardier and are considered by most Americans to be of better quality. The European varieties are larger and sell much better in the market, but are rather subject to mildew, though this disease is not generally so serious as is commonly supposed. Because of the much higher prices usually paid for the European varieties they will be more profitable in many cases, unless the Poorman, a new native variety of large size, proves widely adapted.

Figure 26 shows fruits of the Columbus, Industry, May Duke, Poorman, Downing, and Carrie varieties.

AMERICAN VARIETIES.

Carrie.—Fruit small to medium, too small to be promising, red when ripe. Bush quite free from mildew, with few short thorns; very productive. Grown chiefly in Minnesota, Wisconsin, and neighboring States, where it is of value. When grown in the Eastern States it greatly resembles the Houghton, but it is not recommended to replace that variety.

Downing.—Fruit large for an American sort; pale green. Bush rarely attacked by mildew; very productive. The most widely grown variety in the United States and liked better than other varieties for canning. Notably resistant to the aphids.

Houghton.—Fruit small, dark red. Bush more susceptible to mildew than the Downing, branches somewhat drooping; very productive. One of the most widely grown and productive varieties in the United States, but too small and not liked as well for canning as the Downing. Very susceptible to the aphids.

Josselyn (*Red Jacket*).—Fruit large for an American sort; reddish green. Bush productive; mildews in some localities; a promising variety in some localities in the Northeastern States.

Oregon (*Oregon Champion*).—Fruit large for an American sort; color green; season late. Bush very productive; rarely attacked by mildew. The best variety in the Northwestern Rocky Mountain and Pacific Coast States and promising for all parts of the United States.

Poorman.—Fruit the largest of the American varieties, brilliant red when mature. Bush very vigorous, productive; thorns shorter and fewer and less objectionable than those of other varieties. In New York and Utah it is considered the best of all varieties. Promising for all parts of the United States.

EUROPEAN VARIETIES.

Chautauqua, Columbus, Portage, and Triumph.—These varieties are all very similar, even if not identical. Fruit very large; pale green. Bush in open localities does not mildew seriously; somewhat spreading; productive. Replacing American varieties to some extent because of their larger fruit; generally liked better than the Industry variety.

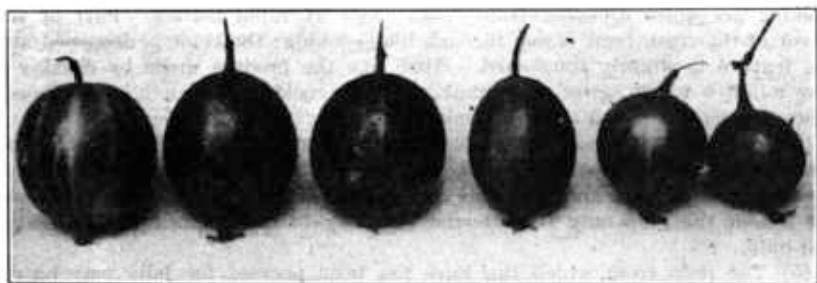


FIG. 26.—Gooseberries of different varieties, showing the relative sizes of the fruits. From left to right the individual fruits represent the Columbus, Industry, and May Duke (European sorts), and the Poorman, Downing, and Carrie (American sorts).

Industry.—Fruit very large, dark red, somewhat hairy. Bush upright; productive. Bush and fruit subject to mildew. Nursery stock of this variety should be secured in the bush rather than the tree form.

Runge.¹—A European variety quite similar to the Columbus. In the Hudson River Valley, where large quantities of it are grown, it appears somewhat more productive and less susceptible to mildew and the berries ripen somewhat later than that variety.

May Duke.—Fruit large, dark red; season early. Bush spreading, productive. This variety is recommended by the New York Agricultural Experiment Station as the best early gooseberry of European parentage.

WAYS OF USING THE FRUIT.

Currants and gooseberries are used chiefly in making jams, jellies, preserves, pies, tarts, etc., rather than in the fresh state, like most other fruits. Both fruits contain a large amount of pectin, which is necessary for jelly making. The currant is commonly considered the best of all fruits for making jelly, but comparatively few know that

¹This variety was introduced and distributed by Mr. J. H. Runge as "Large White German," though the name by which it is designated in Europe is unknown; but in accordance with the rules of nomenclature of the American Pomological Society, it is listed here as Runge, with the consent of the introducer.

gooseberry jelly is very nearly, if not quite, as good as currant jelly and may be made much more cheaply. Furthermore, gooseberries are a general favorite for jam, and gooseberry-raspberry or gooseberry-raspberry-currant jams are better even than jam made of gooseberries alone. In fact, both the currant and the gooseberry may be used in many different ways and are especially valuable for combining with other fruits. Directions for the utilization of the fruit are given in the following pages. The following points should be especially noted:

(1) The seeds of the red and the white currants become very noticeable upon cooking and should be removed when making jams, preserves, etc. Black-currant seeds and gooseberry seeds usually do not become objectionable when cooked and may be left in.

(2) If cooked slowly those gooseberries which are green in color when ripe will make jam or jelly as highly colored as those which are red when fully ripe.

(3) The flavor, texture, and color of gooseberry jam and jelly made by long cooking are quite different from those made by rapid boiling. Part of the flavor of the fresh fruit is lost through long cooking; the color is deepened and the texture is slightly toughened. Some like the product made by cooking a few minutes much better than that made by cooking for an hour or more; others prefer the slowly cooked product.

(4) If a fruit pulp machine similar to a food grinder is used, the skins and seeds of the currant may be readily separated from the pulp. This pulp can then be used for jam and the skins for making jelly. The jam resulting from the use of the pulp only is preferred by many to that containing both skins and pulp.

(5) The pulp from which the juice has been pressed for jelly may be reheated with water and pressed a second time. The resulting juice makes a very good grade of jelly. It is well to combine these different extractions before making them into jelly; otherwise, the later extractions may be somewhat lacking in flavor. In many cases a third or even a fourth extraction of the juice may be made.

(6) In making jams and jellies the proportion of sugar to berries will vary according to individual taste and the character of the fruit. Jams of good flavor may be made by the use of 1 pound of sugar to 1 pound of unripe berries or one-half to three-fourths of a pound of sugar to 1 pound of ripe berries. In making jelly 1 pound of sugar to 1 pint of juice of unripe fruit or three-fourths of a pound of sugar to 1 pint of juice of ripe berries may be used.

(7) Black currants belong to two groups—the European and the American. Although varieties of both sorts have the peculiar aroma of black currants, the American black currant loses most of this characteristic flavor after cooking and makes a mild, delicately flavored product, while varieties derived from the European species make a strong-flavored jam or jelly.

JELLIES.

Jelly of the best quality is easily made from either currants or gooseberries. Although currant jelly has been generally considered the better, some prefer that made from gooseberries. The finest colored product is made from one part of white currants to four parts of red currants.

For use in jelly making the currants and gooseberries should be picked before they are entirely ripe. The fruit should be washed, but need not be stemmed. After mashing add a small quantity of

water, heat almost but not quite to the boiling point, and hold there until the skins turn a lighter color; then strain through a jelly bag. Add three-fourths of a pound of sugar to each pint of juice and boil until a small quantity, when poured from a spoon, flows in a sheet rather than in single drops. Pour into sterilized glasses and, when cool, seal with hot paraffin.

By following these simple directions excellent jellies can be made. In making especially delicate jellies the following precautions should be observed: Remove the stems before cooking. Use only dry berries, and do not use those picked within two days after a rain. That juice is best which flows from the jelly bag without pressing, but the juice which is pressed out may be used for second-grade jelly. Boil the juice separately for 10 minutes and heat the sugar before combining the two. In order to get a deep-red gooseberry jelly the juice should be boiled down slowly. To secure pink gooseberry jelly the juices should be boiled down quickly. Tart jellies may be made by using one-half pound of sugar to each pint of juice, and sweet jellies by using 1 pound of sugar to each pint of juice.

JAMS.

The seeds of red and of white currants are large and very objectionable, so that jams are rarely made from them unless the seeds are first extracted. Even then, the jam is not usually liked as well as gooseberry jam or such combinations as gooseberry-currant or raspberry-currant jams. For use with bread, crackers, etc., raspberry-currant jam is considered one of the most desirable, and then, in order of merit, gooseberry-currant, gooseberry, and currant jams.

For use with meats, gooseberry, gooseberry-currant, and gooseberry-blackberry combinations are all liked. Strawberries, raspberries, apples, cherries, etc., may also be combined with currants and gooseberries, and jams thus made will add a pleasing variety to the supply of preserves.

Black-currant jams have a peculiar flavor, and it is usually necessary for Americans to acquire a taste for them before they are very well liked. Varieties of European parentage are considered better for making jam and jelly than those of American parentage, for the latter lose the distinctive black-currant flavor in cooking.

Gooseberry jam.—Wash, "top and tail" (i. e., remove the stems and the remains of the blossoms), mash, and boil until soft. Add a little water and one-half to three-fourths of a pound of sugar to a pint of gooseberry pulp. Boil rapidly to make a light-colored jam or slowly to make a deep-red jam. When of the desired thickness pour into sterilized jars and seal. By the use of a fruit pulp machine, similar to a food grinder, the skins and seeds may be removed from the gooseberry pulp either before cooking or after the gooseberries have been softened by cooking a short time. This will make "topping and tailing" unnecessary, but the resulting jam is less palatable to some.

Currant jam.—Currant jam is made in the same manner as gooseberry jam. The seeds, however, should be removed with the pulp machine mentioned above or the fruit should be pressed through a colander.

Gooseberry-currant jam.—Very good combinations may be made by using one-half each of gooseberries and currants or a larger or smaller quantity of either, according to the supply. The currant seeds should, of course, be removed. Otherwise, the jam is made according to the directions for gooseberry jam.

Gooseberry-blackberry jam.—In making the combination of gooseberries and blackberries for jam, equal quantities of each fruit or two-thirds blackberries and one-third gooseberries may be used. The blackberries should be mashed, added to the mashed gooseberries, and the jam made according to the directions for gooseberry jam.

Raspberry-currant jam.—Equal quantities of raspberries and currants are used for raspberry-currant jam. Extract the currant seeds before cooking and proceed as above.

Black-currant jam.—This jam should be made according to the directions for making gooseberry jam except that it will be necessary to add considerable water before cooking. It is sometimes recommended that rhubarb be added in the proportion of one part of rhubarb to four parts of currants.

UNFERMENTED JUICES.

While unfermented juices made from gooseberries and currants are not generally used, they are desirable for home purposes. They can be used either separately or combined with each other or with the juices of other fruits.

Use sound, clean, ripe currants and unripe gooseberries. Extract the juice as for jelly making. Strain through a flannel cloth and place in bottles or fruit jars. Put the jars or bottles in a water bath and heat the juice almost to the boiling point, but do not boil. A temperature of 180° F. is desirable. Hold the juice at this temperature for 30 minutes; then remove from the water and seal. The juice should be stored in the coolest place available, as unless made with black currants it gradually loses its color and flavor if kept at living-room temperatures.

Preparation for use.—Some sugar should be added to the juice before bottling or the juice should be reheated and sweetened before using, as juice without sugar or juice to which sugar has been added while cold usually has an unpleasant aroma. Water should be added before using, as the juice is entirely too acid to be used undiluted.

OTHER PRODUCTS.

Currants and gooseberries are used for making preserves, pastes, marmalades, spiced products, catsups, and for canning. Gooseberry tarts and pies made of green gooseberries or green currants are especially popular.

LAWS AFFECTING CURRANTS AND GOOSEBERRIES.¹

Synopsis of Laws and Quarantine Regulations of the United States and Canada and of the Various States Bearing on the Control of the White-Pine Blister Rust, which Affects the Shipment, Planting, and Propagation of Currants, Gooseberries, and Five-Needled Pines.

Connecticut.—The law authorizes the proper State authorities to enter upon any public or private property in the performance of their duties; to uproot and destroy all currant and gooseberry bushes infected with the blister rust; to designate districts within which all currant and gooseberry bushes growing wild, abandoned, or escaped from cultivation may be uprooted and destroyed;² and to maintain quarantines against other States or any designated area within the State.

Maine.—Authority is granted the State forest commissioner to designate control areas within which landowners may be required to remove all currant and gooseberry bushes. If they fail to do so, he may cause such plants to be destroyed and may collect the cost from the owner. He or his authorized agents are empowered to enter upon any public or private property and to destroy all infected and all wild currant and gooseberry bushes in any part of the State. In any designated area he may destroy by specific order any undiseased currant or gooseberry bushes or white pines. He is also authorized to prohibit or regulate the entry into and movement within the State of any living 5-leaved pines, or any currant and gooseberry plants, or other nursery stock or plants which may introduce or spread a dangerous plant disease or insect. The State nursery inspector is empowered to use the above measures in controlling the blister rust on land in the vicinity of nurseries.

Massachusetts.—The law provides for the destruction of all currant and gooseberry bushes which are infected with the blister rust or liable to become infected and gives authority to enter upon any public or private property. This power is vested in the Division of Pest Control, Department of Agriculture.

New Hampshire.—The State forester is empowered to designate control areas and all landowners within such areas may be required to destroy all currant and gooseberry bushes, and within such areas no person shall plant any currant or gooseberry bush without the permission of the State forester. He or his agents have the right to enter upon any public or private property in the performance of their duties. Any currant or gooseberry bushes infected with blister rust are declared a public pest, and any such diseased plants, together with all wild currant and gooseberry bushes, may be destroyed by order of the State forester or his agents. The State nursery inspector is given the above power for the control of blister rust in the vicinity of nurseries and is empowered to prohibit or regulate the entry into and movement within the State of any 5-leaved pine trees or any plants of the genus *Ribes* or other nursery stock or plants which may introduce or spread a dangerous insect pest or plant disease.

New York.—The black currant (including *Ribes nigrum*, *R. odoratum*, and *R. aureum*) is declared a public nuisance and its growth within the State prohibited, except undiseased *Ribes nigrum* in "fruiting-currant districts." Within such designated districts all diseased bushes may be destroyed and all 5-neededled pines may be cut down and the growing of them be prohibited. Outside "fruiting-currant districts" any wild or cultivated currants or gooseberries may be destroyed except within annually certified nurseries. The conservation com-

¹ Compiled by Roy G. Pierce, Forest Pathologist, Office of Blister-Rust Control, Bureau of Plant Industry.

² Local control area in which currant or gooseberry bushes growing wild, abandoned, or escaped from cultivation may be uprooted or destroyed: Litchfield County.

mission may establish quarantine districts within the State and therein may prohibit the possession of any currant or gooseberry bushes, but this shall not apply to undiseased cultivated bushes in "fruiting-currant districts." It may also prohibit the transportation to and from quarantine districts of currant or gooseberry plants.

Pennsylvania.—The secretary of agriculture, through the State nursery inspector or his deputies, may enter upon and inspect any public or private property which might become infested or infected with dangerous or harmful insects or plant diseases. The secretary of agriculture is empowered to prescribe, modify, and enforce such reasonable rules, regulations, and orders as may be needed to enforce the law; also to prohibit and prevent the removal, shipment, or transportation of nursery stock or any other article capable of carrying any injurious or harmful insect pest or plant disease for such periods and under such conditions as in his judgment seems necessary in order to prevent further spread of the infestation or infection. Trees, plants, shrubs, or other plant material infested or infected with injurious insects or plant diseases shall be deemed a public nuisance. It is unlawful for any person in the State knowingly to permit any destructive or dangerously harmful insect or plant disease to exist in or on his premises.

Rhode Island.—Blister rust is declared a public nuisance, and its suppression is authorized. The State board of agriculture may make such rules governing the suppression or extermination of this disease, including the destruction of diseased or exposed species of currants and gooseberries, as it may deem necessary and may enter upon public or private property in the performance of their duties. The board of agriculture may make such regulations governing the transportation of currants and gooseberries as it may deem necessary in combating the disease.

Vermont.—The commissioner of agriculture may use such means as is deemed necessary to exterminate or prevent the introduction of threatening or unusual fungous diseases. He may designate and take control of certain areas to prevent the spread of a plant disease and within such areas may destroy the host of any plant disease. He or his agents may enter upon public or private land in the performance of their duties.

SUMMARY OF FEDERAL AND STATE QUARANTINE REGULATIONS¹ IN EFFECT
ON OR BEFORE APRIL 10, 1922.

FEDERAL QUARANTINES.

Country or State.	Plants quarantined against—		Quarantined area.
	Currants and gooseberries (Ribes).	White and other 5-needled pines.	
United States.....	All kinds....	All kinds....	Europe, Asia, Canada, and Newfoundland.
Do.....	.....do.....	.....do.....	Shipment from territory east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana to territory west of these States is prohibited.
Do.....	All black currants.	.....do.....	All of the New England States and New York. Shipment from this region to other points in the United States is prohibited; shipment is also prohibited from New England to New York.
Do.....	All kinds....	.....do.....	Shipment from those counties in the State of Washington lying west of the crest of the Cascade Mountains to points outside the State is prohibited. ²
Canada.....	.....do.....	.....do.....	All foreign countries, except that shipments of currants and gooseberries from New York to Ontario are permitted.

STATE QUARANTINES.

California.....	All kinds....	All kinds....	All points east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
Colorado.....	.....do.....	.....do.....	All points of the State of Washington lying west of the summit of the Cascade Mountains. ²
Delaware.....	.....do.....	.....do.....	State of Washington and all States east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
District of Columbia.....	All black currants.	.....do.....	All of the New England States and New York.
Georgia.....	All kinds....	.....do.....	All points outside the State.
Idaho.....	.....do.....	.....do.....	All points east of and including Minnesota, Iowa, ¹ Missouri, Arkansas, and Louisiana.
Do.....	.....do.....	.....do.....	British Columbia and that part of the State of Washington lying west of the crest of the Cascade Mountains. ²
Illinois.....	.....do.....	.....do.....	All of the New England States.
Do.....	All black currants.	.....do.....	New York, Pennsylvania, New Jersey, Ohio, Minnesota, Wisconsin, and Michigan.
Kansas.....	All kinds....	.....do.....	All points east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
Maine.....	.....do.....	.....do.....	All points outside the State.
Do.....	.....do.....	All kinds....	A permit must be obtained from the Forest Commissioner at Augusta before shipping into or within the State.
Maryland.....	All kinds....	.....do.....	All of the New England States, New York, New Jersey, Pennsylvania, Wisconsin, Minnesota, Michigan, and Illinois.
Massachusetts.....	.....do.....	None.....	All points outside the State, except under permit from the Commissioner of Agriculture which must accompany the shipment.
Michigan.....	Black currants.	All kinds....	Stock grown in New England, New York, New Jersey, Pennsylvania, Wisconsin, and Minnesota. Permit is required from Michigan Nursery Inspector for shipment of white pines from other States.
Do.....	All kinds except black currants.	.....do.....	Permit required from Michigan Nursery Inspector for stock from the New England States, New York, New Jersey, Pennsylvania, Wisconsin, and Minnesota. (No permit required for red or white currants grown in or near Fredonia, Rochester, Geneva, Newark, and Dansville, N. Y.)
Minnesota.....	.....do.....	All kinds....	All of the New England States, New York, New Jersey, Pennsylvania, Ohio, Wisconsin, and Michigan. Ribes must have the leaves stripped off.
Do.....	Black currants.	.....do.....	All points outside the State.

¹ IMPORTANT! Federal quarantines control the interstate movement of quarantined plants when there are no State quarantines or when the State quarantines are less restrictive; therefore, in determining whether a shipment of currants, gooseberries, or white pines may be made to a certain State, it is necessary to observe both the Federal and State quarantines.

² The quarantined area in Washington includes the counties of Clallam, Clarke, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, San Juan, Skagit, Skamania, Snohomish, Thurston, Wahkiakum, and Whatcom.

SUMMARY OF FEDERAL AND STATE QUARANTINE REGULATIONS, ETC.—Contd.

STATE QUARANTINES—Continued.

Country or State.	Plants quarantined against—		Quarantined area.
	Currants and gooseberries (Ribes).	White and other 5-needed pines.	
Montana.....	All kinds....	All kinds....	All points east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana. All parts of the State of Washington lying west of the summit of the Cascade Mountains. ¹
Nebraska.....	None.....	do.....	All points east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
Nevada.....	All kinds....	do.....	East of Minnesota and the Mississippi River. All foreign countries.
New Hampshire.....	do.....	do.....	All points outside the State. The shipment of all currants and gooseberries within the State is also prohibited.
Do.....	do.....	do.....	Local control areas within which currants and gooseberries may not be planted without the permission of the State Forester. ²
Do.....	do.....	All kinds....	A special certificate must accompany pine shipments into State, showing (1) that blister rust does not exist within the nursery from which stock is shipped; (2) that it is apparently free from this disease; and (3) that all Ribes have been removed from and around the nursery for 300 yards' distance.
New Jersey.....	None.....	do.....	All of the New England States, New York, Pennsylvania, Michigan, Wisconsin, and Minnesota.
New York.....	do.....	do.....	All of the New England States, New Jersey, Pennsylvania, Ohio, Illinois, Indiana, Wisconsin, and Minnesota.
Do.....	All kinds....	None.....	Local control areas in New York (for the growing of white pine) within which no Ribes may be grown or into which no Ribes may be shipped. ³
North Carolina.....	do.....	All kinds....	All of the New England States, New York, New Jersey, Pennsylvania, Ohio, Michigan, Wisconsin, Minnesota, and Canada.
Oregon.....	do.....	do.....	East of the Mississippi River; all foreign countries.
Pennsylvania.....	Black currants.	do.....	All points outside the State.
Rhode Island.....	All kinds....	do.....	A permit from the State board of agriculture is necessary before white pines or gooseberries and currants can be planted in the State; the planting of black currants and flowering currants is prohibited within the State.
South Carolina.....	do.....	do.....	All points outside the State.
South Dakota.....	do.....	do.....	All of the New England States, New York, New Jersey, Pennsylvania, Ohio, Wisconsin, and Minnesota.
Tennessee.....	do.....	do.....	All States east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
Utah.....	do.....	do.....	Do.
Vermont.....	None.....	do.....	All points outside the State.
Washington.....	All kinds....	do.....	All points east of and including Minnesota, Iowa, Missouri, Arkansas, and Louisiana.
Do.....	do.....	do.....	Shipment or movement within or from that part of Washington lying west of the summit of the Cascade Mountains through or into the rest of the State is prohibited. Black currants are ordered destroyed in counties of Whatcom, San Juan, Skagit, Island, Snohomish, King, Kitsap, Mason, Jefferson, and Clallam.
West Virginia.....	do.....	do.....	All points outside the State.
Wisconsin.....	None.....	White pines.	All of the New England States, New York, and Minnesota.

¹ See footnote No. 2 on page 39 for list of counties in Washington quarantined against.² These control areas in New Hampshire at present comprise the *whole* of the following towns: Belknap County—Tilton and Center Harbor; Cheshire County—Surrey; Hillsborough County—Wilton, Milford, Merrimack, and Litchfield; Rockingham County—Derry, Hampstead, Newmarket, Newfields, and Hampton. Other control areas comprise *parts* of the following towns: Belknap County—Alton, Belmont, Gilmanton, Gilford, Laconia, Meredith, and New Hampton; Carroll County—Bartlett, Conway, Moultonboro, Ossipee, Tamworth, Tuftonboro, Brookfield, Wakefield, and Wolfeboro; Cheshire County—Dublin, Chesterfield, Keene, Jaffrey, Fitzwilliam, Marlboro, Gilsom, Swanzy, Westmoreland, and Winchester; Grafton County—Bethlehem, Bristol, Franconia, Hanover, Hebron, Holderness, Landaff, Lisbon, Littleton, Orford, Piermont, and Rumney; Hillsborough County—Amherst, Antrim, Bennington, Goffstown, Hillsboro, and Hollis; Rockingham County—Brentwood, Exeter, Deerfield, Fremont, Kensington, Londonderry, Newton, Northwood, Raymond, Plaistow, and Windham; Strafford County—Dover, Durham, Madbury, Farmington, Rollinsford, and Milton.³ These local control areas in New York are as follows: Clinton County—towns of Au Sable, Blackbrook, and Peru; all of Columbia County except the towns of Chatham, Claverack, Clermont, Gallatin, Germantown, Ghent, Greenport, Kinderhook, Livingston, Stockport, and Stuyvesant; all of Essex County; Niagara County—towns of Lewiston, Niagara, and Porter; Rensselaer County—towns of Berlin, Petersburg, and Stephentown; all of Warren County; all of the Adirondack Park and Catskill Park as defined in chapter 451, laws of 1916.